REMARKS

Claims 19-34 are pending. By the present Amendment, the specification has been amended to overcome the objections thereto set forth in sections 2 and 3 of the Office Action. Applicants note that the text references in sections 2 and 3 of the Office Action correspond to the version of the application text filed with the PCT Request on April 14, 1998. The page and line numbers used herein to refer to the amended, replacement text, however, correspond to the substitute specification submitted with the Preliminary Amendment on October 13, 2000.

In the Office Action, claims 19-34 are rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,219,333, to Ahn. Applicants respectfully traverse this basis for rejecting the claims.

Applicants respectfully submit that the Ahn patent does not anticipate nor render obvious the subject matter of the independent claims 19, 20, 27 and 28 of the present application. The present application relates to a method and an apparatus for performing a fine frequency synchronization of multi-carrier modulated signals in which symbols are defined by phase differences between simultaneous carriers having different frequencies. This is recited in each of the independent claims 19, 20, 27 and 28 of the present application. Since, according to the invention, each symbol is defined by phase differences between simultaneous carriers having different frequencies, phase shift uncertainties related to the transmitted information have been eliminated.

According to claims 19 and 20 of the present application, phase shift uncertainties related to the transmitted information are eliminated from phase differences between phases of the same carrier in different symbols making use of a M-PSK decision device. According to claims 27 and 28 of the present application, respective phases of the same carrier in different symbols are determined, phase shift uncertainties are eliminated from the determined phases in order to determine respective phase deviations per claim 28, and a frequency offset is determined (e.g., by determining a phase difference between the phase deviations per claim 28).

The Ahn patent relates to a system for synchronizing a carrier frequency of an OFDM transmission system which uses one of the multiple carrier modulation methods (see column 1, lines 25 to 27 of the Ahn patent). The Ahn patent is silent regarding a differential coding in the direction of the frequency axis, that is, it is silent regarding signals having symbols being defined by phase differences between simultaneous carriers having different frequencies as defined in the independent claims of the present application.

Moreover, according to the Ahn patent, for fine frequency synchronization, a pilot signal is extracted from the carrier, a phase difference between the extracted pilot signal and a previously extracted pilot signal which is delayed for a duration of one symbol is calculated, and the prime part of the carrier frequency offset within a predetermined frequency is corrected by controlling a gain of the calculated phase difference (see column 2, lines 27 to 33 of the Ahn patent). The phase difference between the pilot signals which are transmitted in the same subchannel between the adjacent two symbols is proportional to the carrier frequency offset (see column 7, lines 46 to 49 of the Ahn patent).

Thus, according to the Ahn patent, pilot signals are used for deriving a phase difference based on which a carrier frequency offset is determined. Thus, it is not necessary to eliminate any phase shift uncertainties related to the transmitted information since pilot signals are not provided for transmitting information but have properties which are known at the transmitter's end and at the receiver's end. Accordingly, it is clear that the Ahn patent does not disclose or suggest an M-PSK decision device as claimed since such a device is not necessary in the system described in the Ahn patent. In particular, an M-PSK decision device is neither anticipated nor suggested by the text passages cited in the subject Office Action.

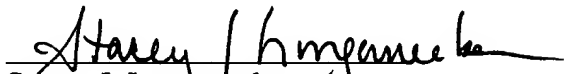
In view of the above considerations, it is clear that the claimed subject matter is not anticipated by the Ahn patent. Moreover, a man of ordinary skill would not take into consideration making use of an M-PSK decision device in a system as described in the Ahn patent which makes use of pilot signals for deriving frequency offsets, nor the above-described means recited in claims 27 and 28. Thus, the claimed subject

matter is also not suggested by the Ahn patent. Accordingly, withdrawal of the 35 U.S.C. § 102(e) rejection of the independent claims 19, 20, 27 and 28 and their corresponding dependent claims 21-26 and 29-34 is respectfully requested.

Making use of information carrying symbols for determining a frequency offset is advantageous when compared to the system taught by the Ahn patent since additional pilot signals can be avoided. Thus, the available bandwidth can be utilized more efficiently. Moreover, the transmitter and the receiver can be implemented with a reduced complexity since pilot signals do not have to be generated at the transmitter's end and pilot signals do not have to be extracted at the receiver's end. Moreover, errors which are possible when extracting the pilot signals can be avoided according to the invention. In addition, a system for synchronizing as taught by the Ahn patent can be used only in connection with such signals which have pilot signals. By constrast, the claimed invention allows more flexibility since it is not restricted to such signals.

In view of the above, it is believed that the application is in condition for allowance and notice to this effect is respectfully requested. Should the Examiner have any questions, the Examiner is invited to contact the undersigned at the telephone number indicated below.

Respectfully Submitted,



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